

APPLICANT : John C. Vellinger, et al.
TITLE OF INVENTION : Apparatus and Method for Mixing Small Volumes of Liquid
APPLICATION SER. NO.: 10/084,136
FILING DATE : 02/27/2002
EXAMINER : David L. Sorkin

REMARKS

1. SPECIFICATION

As the Examiner stated in the October 10, 2003 Office Action, Applicants' attorney responded to the Examiner's restriction requirement with a provisional election without traverse to prosecute the invention of Group I, including Claims 1-20, 37-41 and 44. In response to the Examiner's request, the Applicants confirm their election without traverse to prosecute the claims of Group I. An amendment of inventorship is not made necessary by the election of the Group I claims.

2. DRAWINGS

Pursuant to the Examiner's comments, the drawings have been corrected to include the labels "FIG. 1a," "Fig. 1b," "FIG. 4a," "FIG 4b," "FIG. 6a," and "FIG. 6b" in the relevant locations. Further, Figure 1a is labeled "Prior Art" in accordance with MPEP § 608.02. All drawings, including the corrected drawings, are attached to this Response and Amendment.

3. CLAIM REJECTIONS – 35 U.S.C. § 112

Claims 1, 6, 37, 39, 40 and 44 have been amended to remove all references to "a liquid sample" or "said liquid sample" that could be construed as an element of any claim limitation. The Examiner rejected Claims 1-20, 37-41 and 44 under 35 U.S.C. § 112, stating that it was unclear whether a "liquid sample" was a required element of the claimed structure, and requested that the Applicants state whether a "liquid sample" is a required element of the claimed structure. In response, the Applicants hereby state that a "liquid sample" is not a required element of the claimed structure.

Claim 15 is amended to remove the words "an Eppendorf tube" and add the words "a test tube for the processing of small liquid samples having a volume of approximately 2.0 milliliters or less." The Examiner rejected Claim 15 under 35 U.S.C. § 112 because it used a trademark or tradename as a claim limitation to identify an element of the claimed structure. After

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amendment, Claim 15 no longer uses a trademark or tradename to identify an element of the claimed structure, and is therefore in condition for allowance.

4. CLAIM REJECTIONS – 35 U.S.C. § 102

(i) Claim 1 has been amended to include the word “submerged” before the words “magnetic impeller” in order to highlight the fact that the magnetic impeller of the claimed structure is located beneath the surface of the liquid being mixed by the claimed apparatus. Further, Claim 1 has also been amended to include the words “is capable of imparting axial motion to said magnetic impeller” after the words “electromagnetic driver.”

The Examiner rejected Claims 1-6, 8-10, 15, and 20 under 35 U.S.C. § 102 as being anticipated by MacMichael *et al* (U.S. 4,759,635). However, the Applicants respectfully point out that MacMichael requires a stirrer apparatus in which a guide rod is provided for “guiding of the buoyant stirrer so that it rotates about an axis extending through the flask, generally perpendicularly to the liquid surface, and is able to move along that axis with the change in level.” (Col. 2, Lines 15-19). Therefore, the magnetic impeller disclosed by MacMichael is restricted by the guide rod to rotation about a certain *horizontal* axis. Thus, the electromagnetic driver of MacMichael is not capable of imparting motion along a vertical axis to the magnetic impeller.

Conversely, it is clear from Claim 1 as amended that the electromagnetic driver of the claimed structure is capable of imparting axial motion to the magnetic impeller. Further, the claimed structure requires no guide rod to restrict the motion of the magnetic impeller to rotation about a certain axis; in fact, it is preferred that the magnetic impeller of the claimed structure transfer momentum through the liquid sample radially and axially. Therefore, the claimed structure is not anticipated by MacMichael.

Moreover, the Examiner cites element (26) of MacMichael as anticipating the magnetic impeller of the Applicant’s claimed structure. Element (26) of MacMichael is a magnetic bar attached to the bottom of a required *floating* magnetic stirrer (22). To the contrary, the claimed structure requires that the magnetic impeller be submerged. Therefore, because MacMichael

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does not disclose the submerged magnetic impeller of Claim 1 as amended, MacMichael does not anticipate the claimed structure.

Because MacMichael does not teach or suggest every element of Claim 1, it does not anticipate amended Claim 1. *Verdegaal Bros. v. Union Oil Company of California*, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987); MPEP §2131. In addition, none of the cited prior art references anticipate or obviate amended Claim 1. Further, because Claims 2-6, 8-10, 15 and 20 depend from Claim 1 and therefore include all the limitations of Claim 1, they are not anticipated by the MacMichael reference.

(ii) Claim 1 has been amended to include the words “imparts axial motion to said magnetic impeller and” before the words “is powered by a signal generator” in order to highlight the fact that the magnetic field generated by the magnetic driver is capable of moving the magnetic impeller in the axial direction. Claim 44 is similarly amended to include the word “axial” before the words “motion to said permanent magnetic impeller” to highlight that the magnetic field generated by the magnetic driver is capable of imparting axial motion to the magnetic impeller (i.e., vertical motion if the electromagnetic driver is located below the liquid sample container, as shown in Figures 1(b), 4(a), 6(a) and 6(b)).

The Examiner rejected Claims 1-6, 10, 12, 15, 16, and 44 under 35 U.S.C. § 102 as being anticipated by Lu, *et al.* (U.S. 3,680,843). Lu teaches a magnetic mixer in which a coil has a pole piece attached at each of two ends. Each of the pole pieces has a finger formed thereon, and the two fingers are aligned directly opposite each other. The sample cell, or liquid container, of Lu rests in the gap between the two fingers. When the coil is energized, the two fingers concentrate a radial magnetic field through the liquid sample, causing the magnetic stirring bar to move in a radial plane between the two fingers.

In stark contrast to the present invention, Lu does not allow axial motion on the part of the impeller. Therefore, Lu does not anticipate the claimed structure as amended. Because the remaining claims 2-6, 10, 15, and 16 rejected by the Examiner as anticipated by Lu depend from Claim 1, now deemed allowable, they also are not anticipated by Lu.

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(iii) Claim 1 is amended to include the words “capable of operating as a single coil” after the words “an electromagnetic driver” to highlight the fact that the electromagnetic driver of the claimed structure requires only a single electromagnetic coil and emphasize that the claimed structure does *not* require multiple coils in order to impart motion to the magnetic impeller.

The Examiner rejected Claims 1-7, 10-15, and 37-41 as anticipated by Sanderson *et al.* (U.S. 4,199,265). The Examiner stated that elements 26, 28, 32, 33, 24, and 36 anticipate the electromagnetic driver element of the claimed structure. However, the Applicants respectfully point out that the invention disclosed by Sanderson requires multiple coils geometrically arranged in relation to each liquid container in order to produce a rotary stepping magnetic field. (Sanderson Col. 9, Line 1.) The claimed structure, as amended, includes an electromagnetic driver that requires only a single coil per liquid container, and does not produce a rotary stepping magnetic field. Therefore, the claimed structure, as amended, is not anticipated by Sanderson.

Similarly, Claim 37 has been amended to include the words “capable of operating as a single coil” after the words “electromagnetic driver” to highlight the fact that the electromagnetic driver of the claimed structure does not require multiple coils in order to operate the invention. This should clearly establish that Sanderson does not anticipate Claim 37 because Sanderson requires multiple coils in order to produce the rotary stepping magnetic field, whereas the claimed structure requires only a single coil and does not produce a rotary stepping magnetic field.

Further, Claims 39-41 were rejected by the Examiner as containing no structural limitations different from those of Claim 38. Claims 39-41 have been amended to highlight the fact that the structure of the algorithm claimed in Claim 38 is changed depending on the nature of the variables comprising the algorithm. Also, Claims 39-41 have been amended to highlight the fact that the computer claimed in Claim 37 is programmed to receive values for the algorithm variables claimed in Claims 39-41. Accordingly, it should now be apparent that Claims 39-41 each contain structural limitations distinct from that of Claim 38.

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Because Sanderson fails to teach or suggest every element of Claims 1 and 37, it does not anticipate amended Claim 1 and Claim 37. *Verdegaal Bros. v. Union Oil Company of California*, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987); MPEP § 2131. In addition, none of the cited prior art references anticipate or obviate amended claims 1 or 37. Further, because Claims 2-7 and 10-15 depend from Claim 1 and Claims 38-41 depend from Claim 37, they are not anticipated by the Sanderson reference.

(iv) The Examiner rejected Claims 1-7, 10, and 15 of the claimed structure as anticipated by Tatevosian *et al.* (U.S. 4,720,025). The Applicants respectfully traverse the rejection on the ground that the hopper (1) does not anticipate the liquid container of the claimed structure. The hopper (1) of Tatevosian is open at the bottom and rests upon a latticed partition (4). When the source (6) of Tatevosian is turned off, eliminating the magnetic field it creates when turned on, the kinematically disconnected magnetic bodies (5) tend to cluster in the openings between the latticed partition (4). (Col. 4, Lines 57-63). However, when the source (6) is turned on, the alternating magnetic field it creates forces the kinematically disconnected magnetic bodies (5) to separate, which “promotes penetration of the loose material 2 through the bed of moving magnetic bodies 5 to the latticed partition 4 and escape of the loose material 2 from the feeder.” (Col. 5, Lines 2-13). The word “container,” as defined by Webster’s Revised Unabridged Dictionary, means “one who, or that which, contains. When in operation, the invention of Tatevosian allows the escape of the material placed in the hopper, and therefore cannot “contain” the material. In order to anticipate a claim, the elements of the cited reference must be arranged as required by the claims. *In re Bond*, 910 F.2d 831 (Fed. Cir. 1990); MPEP § 2131. Accordingly, Tatevosian does not anticipate the claimed structure because, when in operation, the hopper (1) cannot serve as a container for the apparatus. As each of Claims 1-7, 10, and 15 include the limitation of a liquid container, Tatevosian does not anticipate any of those claims.

In addition, the Examiner stated that the magnetic impeller element of the claimed structure is anticipated by element (5) of Tatevosian. However, the Applicants respectfully

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traverse on the ground that Tatevosian discloses the use of multiple kinematically disconnected magnetic bodies. Tatevosian requires that there be numerous separate magnetic bodies that initially cluster at the bottom of a hopper that rests upon a latticed partition, then separate with the application of an electromagnetic field so that loose material (as opposed to a liquid) may penetrate through the cluster of kinematically disconnected bodies and pass through the latticed partition underneath the hopper. (Tatevosian Line 5, Col. 2-16). Therefore, because Tatevosian *requires* numerous magnetic bodies to be present within the apparatus in order to properly function. By contrast, the claimed structure, needs only a single magnetic impeller for proper function. As each of Claims 1-7, 10, and 15 include the limitation of a magnetic impeller, as opposed to the kinematically disconnected magnetic bodies of Tatevosian, Tatevosian does not anticipate any of those claims.

Because Tatevosian fails to teach or suggest every element of Claim 1, it does not anticipate amended Claim 1. *Verdegaal Bros. v. Union Oil Company of California*, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987); MPEP §2131. In addition, none of the cited prior art references anticipate or obviate amended Claim 1. Further, because Claims 2-7, 10, and 15 depend from Claim 1 and therefore include all the limitations of Claim 1, they are not anticipated by the Tatevosian reference.

5. 35 U.S.C. § 103(a) REJECTION: Claims 17-19

The Examiner rejected Claims 17-19 under § 103(a) as being unpatentable over Lu *et al.* in view of Cleveland *et al.* (U.S. 3,680,843). The Examiner acknowledged that Lu fails to teach an apparatus comprising 24 liquid sample containers, 96 liquid sample containers or circularly-arranged containers, but stated it would have been obvious to provide the magnetic mixing of 24 containers, 96 containers and circularly-arranged containers of Cleveland. However, under MPEP § 2143, to establish a *prima facie* case of obviousness, the combined prior art references must teach or suggest all of the claim limitations. As discussed above in regard to the 35 U.S.C. § 102 rejections, Lu does not teach or suggest all the elements of Claim 1, as amended, of the claimed structure. Lu teaches a magnetic mixer in which a magnetic impeller moves in the radial

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plane only. To the contrary, the present application claims an apparatus that allows the magnetic impeller to move in the axial direction. Likewise, Cleveland does not supply this teaching.

As a result, the combination of Lu and Cleveland does not disclose or suggest all of the limitations set forth in Claim 1 as amended, and therefore cannot serve to render it obvious. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974); MPEP § 2143.03. Claims 17-19 depend from Claim 1 and therefore include all its limitations, so they are not rendered obvious either. For all these reasons, the amended claims are deemed allowable over the cited references.

6. Other Amendments

- i) Claim 37 is amended to remove the word “providing,” which was inadvertently included at the beginning of the claim. This amendment is not substantive and is not made for the purposes of overcoming prior art.
- ii) Claim 5 is amended to include the words “in multiple directions” after the words “imparts motion” to highlight that in one embodiment of the present invention, the coupled electromagnetic field of the electromagnetic driver imparts motion in more than a single plane to the magnetic impeller.
- iii) Claim 6 is amended to include the words “radially and axially” after “transfers momentum” to highlight that in one embodiment of the present invention, the magnetic impeller transfers momentum to the liquid contained in said liquid sample container.
- iv) Claim 19 is amended to add the word “container” after the words “liquid sample,” correcting the inadvertent omission of “container.” This amendment is not substantive and is not made for the purpose of overcoming prior art.

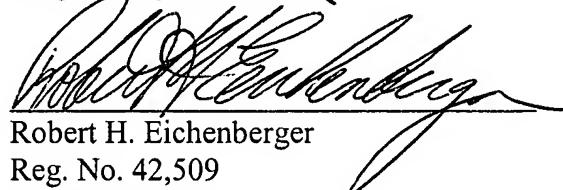
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CONCLUSION

For all of the foregoing reasons, the amended claims are deemed allowable over the art of record, and applicants respectfully request the claims be allowed. This Response and Amendment, along with the accompanying Petition for Extension of Time, is deemed to comply with the requirements for responses set forth in the 37 C.F.R. 1.121. If for any reason the Examiner deems otherwise, please contact the undersigned so that prompt remedial action may be taken.

April 12, 2004

Respectfully submitted,



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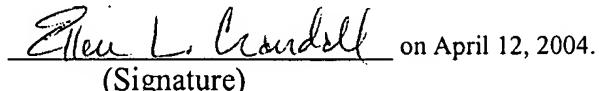
I hereby certify that the following documents

Response and Amendment (14 pages)
37 C.F.R. § 1.136(a) Petition For Extension of Time (1 page)
Revised Figures 1-6 (6 sheets)
Fee Transmittal
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are being deposited with the United States Postal Service with sufficient postage paid as Express Mail, "Post Office to Addressee," in an envelope addressed to: Mail Stop Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

Ellen L. Crandall

(Depositor's Name)



Ellen L. Crandall on April 12, 2004.
(Signature)

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